

REMARKS

Favorable reconsideration of this application in view of the above amendments and following remarks is respectfully requested.

Claims 1, 4, 6-13, 15-18, and 20-35 are pending in this application. Claims 25-34 are withdrawn from consideration. By this amendment, Claims 1, 4 and 8-9 are amended; Claim 2 is canceled; and no claims are added herewith. It is respectfully submitted that no new matter is added by this amendment.

In the outstanding Office Action, Claims 4, 8, and 9 were rejected under 35 U.S.C § 112, second paragraph; and Claims 1-2, 4, 6-13, 15-18, 20-24, and 35 were rejected under 35 U.S.C. § 103(a) as unpatentable over EP 1271580 to Chone in view of Usami.

With respect to the rejection under 35 U.S.C § 112, second paragraph, Claims 4 and 8-9 are amended to clarify the features recited therein. Accordingly, withdrawal of the 35 U.S.C § 112 rejection is respectfully requested.

With respect to the rejection under 35 U.S.C. § 103(a) as unpatentable over Chone in view of Usami, that rejection is respectfully traversed. In particular, it is respectfully submitted that the applied art does not teach, suggest, or render obvious a film including a first layer having only a first kind of particles of one average diameter or length, and a second layer having the first kind of particles and additionally a second kind of particles, the second kind of particles having a larger average diameter or length than the first kind of particles, and further that the porous film has a gradient of light scattering strength extending from the front face to the back face, with the light scattering strength increasing towards the back face, wherein said gradient of light scattering strength starts with zero light scattering at said front face, as recited in Claim 1.

The Office Action relies on MPEP § 2144 and asserts on page 4 that the “omission of an element and its function is obvious, if the function is not desired” and therefore “the light

scattering effect may not be desired at the cell surface of Chone,” and “it would be obvious for one having ordinary skill in the art to eliminate big particles from the first layer,” resulting in a “modified teaching of Chone.”

Applicants respectfully disagree that it would have been obvious to modify Chone as asserted in the Office Action. Chone clearly teaches a first layer that includes two different kinds of particles, “small size particles” of sizes less than 30 nm and preferably more than 10 nm, and “big size particles” of sizes bigger than 100 nm and preferably smaller than 200 nm, which results in an average particle size of 30-50 nm. Please see paragraph [0026]. According to Chone, such TiO₂ films exhibit a much higher photon conversion efficiency (IPCE %) than TiO₂ films with small or big particles only. Please see Fig. 4 and paragraphs [0047] and [0049] of Chone.

Therefore, an elimination of the big size particles from the first layer of Chone would result in a significantly reduced photon conversion efficiency, however, a desired function in Chone is to have higher photon conversion efficiency. That is Chone explicitly states the aim to improve the photon conversion efficiency by improving the light scattering effect in a TiO₂ film (see abstract). Therefore, contrary at least to the discussion in MPEP § 2144 and the assertions in the Office Action, one having ordinary skill in the art would not have been motivated to modify Chone to omit the scattering of big size particles from the first layer as Chone teaches away from such a modification since such a modification would change the desired functionality of the device of Chone.

Similarly, Applicants submit that it would not have been obvious to one of ordinary skill in the art to replace the scattering first layer of Chone with the non-scattering small particle film of Usami. The photon conversion efficiency of the first layer of Chone reaches values between 80 and 90% (see Fig. 4 and paragraph [0047] of Chone), which is about twice as high as the efficiency of the small particle film of Usami, see page 108, left column, lines

12-24 of Usami. As discussed above, a desired function in Chone is to have higher photon conversion efficiency. For at least this reason, a person skilled in the art would not modify the teaching of Chone by replacing the first layer of Chone comprising small and big size particles with the non-scattering small particle film of Usami.

Due to the presence of particles larger than 100 nm in the first layer, Chone also fails to teach or even suggest the newly added feature of Claim 1, namely that the gradient of light scattering strength of the porous film starts with zero light scattering at the front face of the film. As discussed above, one of ordinary skill in the art would have no motivation to eliminate the big particles from the first layer or to replace the scattering first layer of Chone with a non-scattering layer as taught by Usami.

Again, Chone in [0032] discusses that preferably the average metal oxide particle size of the second layer is similar to the one of the said first layer. The distribution of the metal oxide particle sizes of said second layer is from 10 to 200 nm with an average size from 30 to 50 nm, which is similar to the average particle size of the first layer. See for example [0026] of Chone. Thus, both layers of Chone clearly contain small size particles as well as big size particles, i.e. particles in the range from 10 to 200 nm. In contrast, the porous film as recited in Claim 1 includes a first layer with only one kind of particles (“a first kind of particles”) and a second layer which contains the first and, in addition thereto, a second kind of particles, which is bigger in size. These features are not taught or suggested by Chone.

Further, Applicants submit that it is not the intention of MPEP §2144 to encourage the omission of elements from a reference on the basis of mere speculation, especially in the present situation where the applied reference of Chone considers the “element to be omitted” as indispensable for its teaching as discussed above. As such, Applicants submit that the Office Action fails to give a motivation for why a person skilled in the art would choose to modify the teaching of Chone by eliminating big size particles from the first layer.

Moreover, the cited references do not recognize the advantageous results achieved by the present invention, thus further demonstrating the non-obviousness of the present claims. In accordance with the present invention, Applicants have recognized a combination of features which provides advantageous scattering strength that can be altered while keeping the adsorption strength at a substantially constant level.

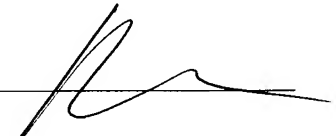
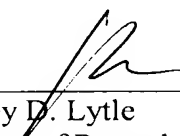
As such, the advantageous features of the claimed invention are not taught or suggested by the applied art either alone or in combination nor would it have been obvious to combine the teachings of the applied art. Withdrawal of the rejection of the claims under 35 U.S.C. § 103 is respectfully requested.

Consequently, for the reasons discussed in detail above, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. Therefore, a Notice of Allowance is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact the undersigned representative at the below-listed telephone number.

Respectfully submitted,

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